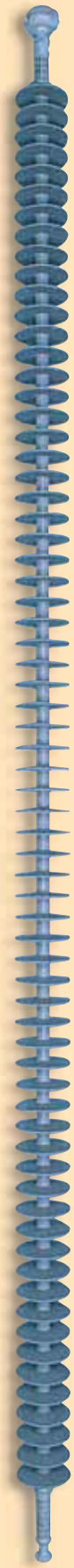


CATALOG 231

Polymer Suspension Insulators 69kV to 765kV

NGK-LOCKE, INC.
Virginia Beach, Virginia, U.S.A.

TABLE of CONTENTS

DESIGN FEATURES

Polymer suspension insulators of NGK-LOCKE , INC. NGK are **one-piece** products **up to 21 feet with no joints** on the housing (sheath) or at the weathershed interfaces. Housing is directly vulcanized to the core during compression molding process, providing superior bonding performance. Also, pressure controlled uniform crimping provides superior long-term mechanical performance.

HOUSING TO CORE — Housing and core are **chemically bonded** and the interface strength between housing and core is higher than the tearing strength of housing itself.

SHED PROFILE — On the basis of contamination level, we can propose best-fit shed profile. (See page 6). Shed profile complies with IEC Pub. 60815 "Guide for the selection of insulators in respect of polluted conditions."

END FITTING TO CORE — Crimping process is **multi-step, uniform circumferential compression, controlled pressure** for each step, minimizing stress concentration.

ACOUSTIC EMISSION (AE) DETECTION — During crimping of end fittings on the core, all the products are checked for possible damage of core by AE detection.

HOUSING AND END FITTING INTERFACE (SEALING) — **Double "O" Ring** integral to the housing provides positive contact with the end fittings and RTV (Room Temperature Vulcanized) **Sealant** prevents the ingress of moisture **(Water-tight Sealing Structure)**.

MATERIAL

WEATHERSHEDS (SHED) & HOUSING (SHEATH) — Weathersheds and housing are the same material **(100% silicone rubber)** before adding fillers. The best mixture of base polymer, fillers, and additive agents achieves excellent contamination, weatherability, anti-tracking, and anti-erosion performance.

CORE — High quality pultruded FRP (Fiberglass Reinforced Plastic) rod is used. The rod is made with good alignment and distribution of fibers within **Epoxy** resin.

END FITTINGS — High grade forged steel or ductile iron is used. And all ferrous parts, other than stainless steel, are galvanized in accordance with ASTM A153. Cotter key is made from stainless steel.

GRADING RINGS — High grade aluminum alloy is used.

DEFINITION OF RATING

SPECIFIED MECHANICAL LOAD (SML) — The SML is a load specified by the manufacturer that has to be verified during a mechanical load test. It forms the basis for selection of an insulator.

ROUTINE TEST LOAD (RTL) — The RTL is a rating equal to 50% of the SML.

STANDARD MATERIAL TEST

Polymer suspension insulators of **NGK-LOCKE, INC.**, pass all the requirements of prototype test and design test specified in **ANSI C29.11** and **ANSI C29.12**, Latest Issue and also comply with the following tests.

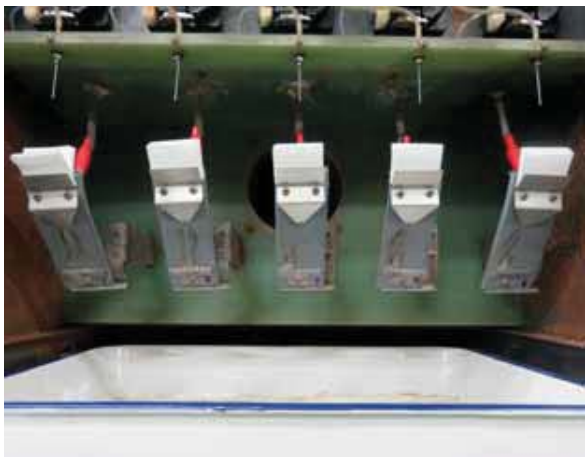
ACCELERATED WEATHERING (XENON-ARC METHOD) — Rubber specimens measuring 110mm x 75mm x 2mm were exposed in a Xenon Test Chamber for 1,000 hours. A visual evaluation was then performed; the specimens passed this test, no surface degradation occurred, such as cracks and/or raised areas. (Test method: IEC Publication 62217 9.3.2, Accelerated Weathering Test)

TRACKING AND EROSION (MULTIPLE STRESSES) — Our polymer insulators pass tracking and erosion testing (5,000 hours) specified in IEC Publication 62217:2005 Annex B. Annex B uses continuous stress in an attempt to detect potential weaknesses in material and design, which could compromise the insulator performance in service.

NON-FLAMMABILITY — Samples 5"x0.5"x0.12" are subjected to IEC Pub. 60707 flammability test. The samples meet the criteria FV0. Also this test is specified in IEC Pub. 61109, **Latest Issue**

POWER ARC — Polymer insulators withstand 150kA•cycles power arc under applied tension load of 3000 lbs without failure.

HIGH PRESSURE WASHING — Polymer insulators are designed to withstand high pressure water washing at 550psi nozzle pressure, nozzle diameter 1/4", and the distance of 10' from the nozzle to polymer insulators. Generic washing recommendations can be provided upon request.



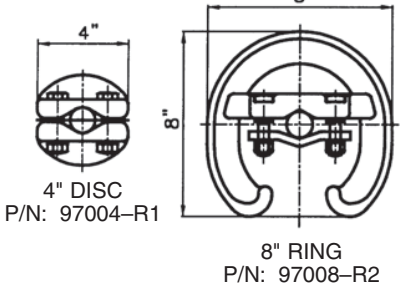
Inclined Plane Testing

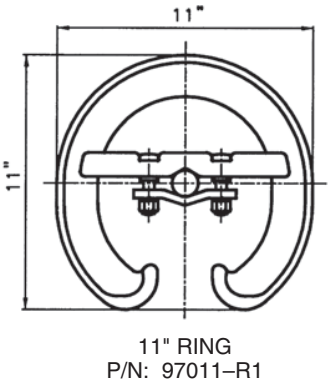
Salt Fog Testing

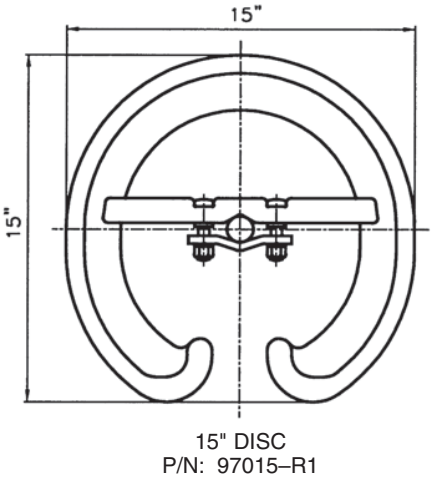
GRADING RINGS

Grading discs and/or rings are applied to NGK polymer insulators for higher operating voltages to reduce electrical stress concentration on and within the insulator and to reduce radio and/or television interference. General recommendations of grading ring application are as follows.

System Voltage		138 kV and below	161 kV	230 kV	345 kV	500 kV
NGK Grading Rings (Discs) Application	Top (tower side)	None	None	None	ø4" disc	ø8" Ring*
	Bottom (line side)	None	ø4" disc	ø8" Ring*	ø11" Ring	ø15" Ring
NGK Insulator Cat# Suffix		—	-04	-08	-41	-85







Grading discs are factory-installed. Field installation is required for grading rings. The clamp part of the NGK grading ring is designed to ensure correct position mounting only.

* In case of “SL” and “SE” sheds, need larger diameter of grading ring such as ø9.5" or ø11". For other combinations of corona ring application please check with factory.

ADJUSTMENTS WITH GRADING RING

The electrical and physical values shown in the following pages are for the insulators without grading rings or discs. The following table is required if grading rings or discs are used for system voltages of 161 kV and above.

System Voltage		161 kV	230 kV	345 kV	500 kV
Adjustment of tabular values for 25k, 30k, 50k and 80k SML insulators	Arcing Distance, inch (mm)	-0.8 (-20)	-2.0 (-50)	-2.8 (-70)	-5.5 (-140)
	Low Frequency F/O Dry, kV	-5	-15	-25	-50
	Low Frequency F/O Wet, kV	-5	-15	-20	-45
	Critical Impulse F/O pos., kV	-10	-30	-45	-85
	Critical Impulse F/O neg., kV	-15	-30	-45	-90
	Net Weight, lb (kg)	+1 (+0.45)	+3.1 (+1.4)	+5.4 (+2.5)	+14.3 (+6.5)

The above adjusted electrical values are just for guidance because of non-linearity of electrical characteristics. Based on insulator application, corona rings may be necessary. Complete corona ring configurations and sizes are not listed in the catalog selection; for additional information regarding corona rings or for insulator configurations not listed, please inquire through your regional technical contact or via our website at: www.ngk-**locke**.com

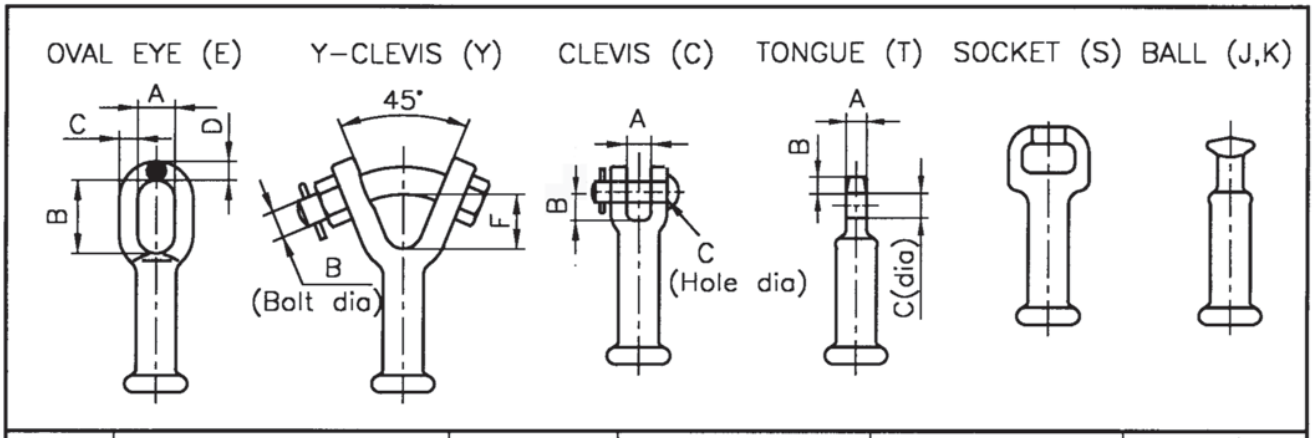
CATALOG NUMBER SYSTEM

251-SS310-SJ-08

- **251** — SML (x1000lbs.)
  - Core Diameter
    - 1: 5/8" (16.5mm)
    - 2: 15/16" (24mm)
    - 3: 1-1/4" (32mm)
- **SS** — Shed Shape
  - SC: Compact
  - SS: Standard
  - SL: Longer Leakage
  - SE: Extra Long Leakage
- **310** — Number of Sheds
- **S** — Design Variation
- **J** — Type of End Fittings, tower & line side
  - E: Oval Eye
  - Y: Y-Clevis
  - C: Clevis
  - T: Tongue
  - S: Socket
  - J: Ball (ANSI J)
  - K: Ball (ANSI K)
- **08** — Grading Ring Application tower & line side
  - 0: None
  - 4: 4" disc
  - 8: 8" ring
  - 9: 9.5" ring
  - 1: 11" ring
  - 5: 15" ring

CONFIGURATION OF END FITTINGS

Dimension Unit: inch (mm)



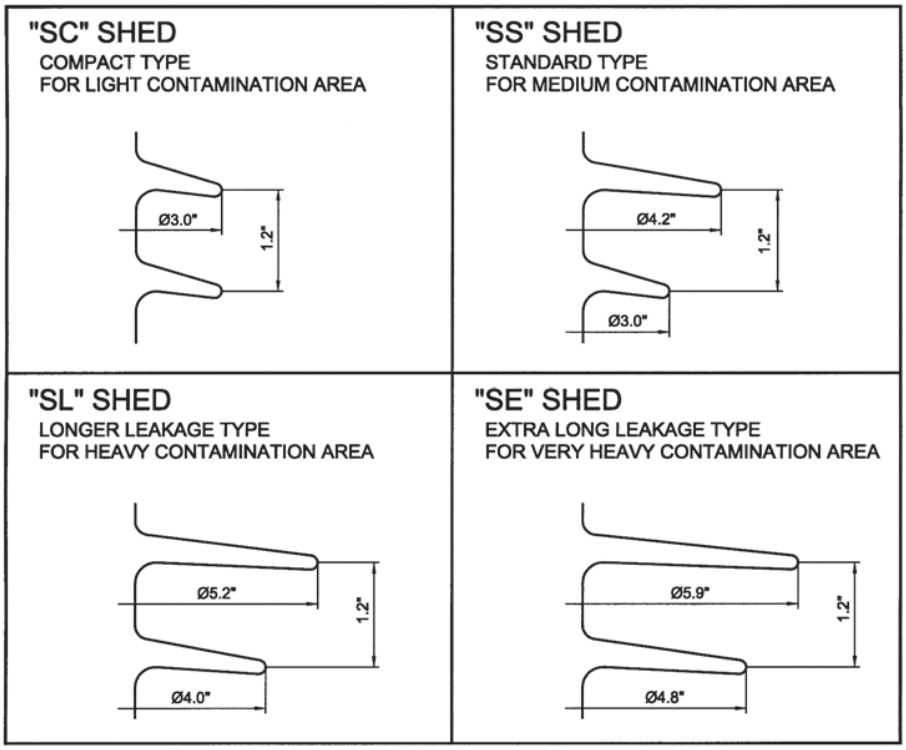
SML LBS(kN)	Oval Eye				Y–Clevis		Clevis			Tongue			Socket/Ball	
	A	B	C	D	F min	B	A	B min	C	A	B	C	Type	ANSI Class
25,000 (111)	1.02 (26)	2.0 (51)	0.63 (16)	0.63 (16)	1.54 (39)	0.75 (19)	0.75 (19)	0.98 (25)	0.69 (17.5)	0.53 (13.5)	0.52 (13.3)	0.69 (17.5)	J	52–5
30,000 (133)	1.02 (26)	2.0 (51)	0.87 (22)	0.87 (22)	1.57 (40)	0.875 (22)	0.75 (19)	0.98 (25)	0.69 (17.5)	0.53 (13.5)	0.52 (13.3)	0.69 (17.5)	J	52–5
50,000 (222)	1.02 (26)	2.0 (51)	0.87 (22)	0.87 (22)	1.57 (40)	0.875 (22)	1.06 (27)	1.26 (32)	0.94 (24)	0.90 (22.8)	0.59 (14.9)	0.94 (24)	K	52–11
80,000 (356)	1.14 (29)	2.9 (74)	0.98 (25)	1.38 (35)	—	—	—	—	—	—	—	—	—	—

HOW TO SELECT CATALOG NUMBER

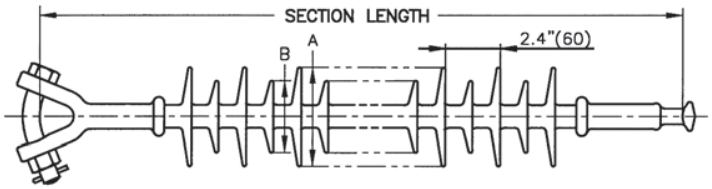
Our catalog number is self-explanatory. Please follow the following general guidance to determine a catalog number.

No.	Procedures	Example (equivalent to ANSI 52-5, 7 bells)	
1	To select mechanical rating, **SML**	If rating is 25kip, **251** (refer to page 5)	**251**-S_-__0-__-__
2	To select **Shed Profile** on the basis of leakage distance. See the following "Shed profile" for details.	If medium contamination area, shed profile is **SS** (refer to shed profile in this page)	251-S**S**__0-__-__
3	To select **Number of Sheds** on the basis of section length	If section length is 40 1/4" (=5 3/4" x7), number of sheds is **25** (refer to page 7~16)	251-SS**25**0-__-__
4	To select configuration of **End Fitting**	If socket & ball, **-SJ** (refer to page 5)	251-SS250-**SJ-**__
5	To select **Grading Ring** application on the basis of system voltage	If system voltage is 230kV, ring application is **–08** (refer to page 4)	251-SS250-SJ-**08**

SHED PROFILE



ANSI 25kip / SC, SS, SL Shed Series



Shed Type	Shed Diameter	
	A	B
"SC" Normal	ø3.0" (ø76mm)	ø3.0" (ø76mm)
"SS" Alternating	ø4.2" (ø106mm)	ø3.0" (ø76mm)
"SL" Alternating	ø5.2" (ø132mm)	ø4.0" (ø102mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length YJ *inch* (mm)	Section Length SJ *inch* (mm)	Section Length EJ *inch* (mm)	Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover Dry kV	Low Frequency Flashover Wet kV	Critical Impulse Flashover Positive kV	Critical Impulse Flashover Negative kV	Approx. Weight *lbs.* (kg)
69	251-SC210-YJ	21	*36.0* (915)	*35.4* (900)	*36.4* (925)	*58.7* (1491)	*26.5* (674)	305	270	450	480	*7.1* (3.2)
	251-SS210-YJ					*71.5* (1816)	*27.1* (688)	310	275	460	490	*8.1* (3.7)
	251-SL210-YJ					*92.8* (2356)	*27.9* (708)	320	280	470	505	*10.1* (4.6)
69	251-SC250-YJ	25	*40.7* (1035)	*40.2* (1020)	*41.1* (1045)	*69.9* (1775)	*31.2* (794)	350	310	525	560	*7.6* (3.5)
	251-SS250-YJ					*85.0* (2159)	*31.8* (808)	355	310	535	565	*8.9* (4.0)
	251-SL250-YJ					*110.3* (2802)	*32.6* (828)	360	320	545	580	*11.3* (5.1)
69/115	251-SC280-YJ	28	*44.3* (1125)	*43.7* (1110)	*44.7* (1135)	*78.3* (1988)	*34.8* (884)	380	340	580	615	*8.1* (3.7)
	251-SS280-YJ					*94.5* (2401)	*35.1* (892)	385	340	585	620	*9.4* (4.3)
	251-SL280-YJ					*122.9* (3122)	*35.8* (909)	390	345	595	630	*12.1* (5.5)
69/115	251-SC310-YJ	31	*47.8* (1215)	*47.2* (1200)	*48.1* (1225)	*86.7* (2201)	*38.3* (974)	415	365	635	675	*8.5* (3.9)
	251-SS310-YJ					*105.2* (2673)	*38.9* (988)	420	370	645	680	*10.1* (4.6)
	251-SL310-YJ					*136.7* (3471)	*39.7* (1008)	430	380	655	695	*13.0* (5.9)
115/138	251-SC350-YJ	35	*52.6* (1335)	*52.0* (1320)	*53.0* (1345)	*97.8* (2485)	*43.1* (1094)	460	405	705	750	*9.1* (4.1)
	251-SS350-YJ					*118.7* (3016)	*43.6* (1108)	465	410	715	760	*10.8* (4.9)
	251-SL350-YJ					*154.2* (3917)	*44.4* (1128)	470	420	730	770	*14.2* (6.4)
138	251-SC390-YJ	39	*57.3* (1455)	*56.7* (1440)	*57.7* (1465)	*109.0* (2769)	*47.8* (1214)	505	445	780	825	*9.6* (4.4)
	251-SS390-YJ					*132.2* (3359)	*48.4* (1228)	510	450	790	835	*11.6* (5.3)
	251-SL390-YJ					*171.8* (4363)	*49.1* (1248)	515	460	800	850	*15.3* (6.9)
138	251-SC410-YJ	41	*59.6* (1515)	*59.1* (1500)	*60.0* (1525)	*114.6* (2911)	*50.2* (1274)	525	465	815	865	*9.9* (4.5)
	251-SS410-YJ					*139.0* (3531)	*50.7* (1288)	530	470	825	875	*11.9* (5.4)
	251-SL410-YJ					*180.6* (4586)	*51.5* (1308)	540	480	840	885	*15.9* (7.2)
138/161	251-SC450-YJ	45	*64.4* (1635)	*63.8* (1620)	*64.8* (1645)	*125.8* (3195)	*54.9* (1394)	570	505	890	940	*10.5* (4.8)
	251-SS450-YJ					*152.5* (3874)	*55.4* (1408)	575	510	900	950	*12.7* (5.8)
	251-SL450-YJ					*198.1* (5032)	*56.2* (1428)	580	520	910	965	*17.0* (7.7)
161	251-SC500-YJ	50	*70.3* (1785)	*69.7* (1770)	*70.7* (1795)	*139.8* (3550)	*60.8* (1544)	625	555	980	1040	*11.2* (5.1)
	251-SS500-YJ					*168.8* (4288)	*61.1* (1552)	625	560	985	1045	*13.6* (6.2)
	251-SL500-YJ					*219.5* (5575)	*61.8* (1569)	635	565	995	1055	*18.4* (8.3)
161	251-SC550-YJ	55	*76.2* (1935)	*75.6* (1920)	*76.8* (1950)	*153.7* (3905)	*66.7* (1695)	680	605	1075	1135	*11.9* (5.4)
	251-SS550-YJ					*186.3* (4731)	*67.3* (1709)	685	610	1080	1145	*14.6* (6.6)
	251-SL550-YJ					*242.0* (6147)	*68.1* (1729)	690	615	1095	1155	*19.9* (9.0)

25kip Other End Fitting Combination Section Length Adjustment Table, **Base Coupling: Eye-Ball (EJ)**, Inch					
Eye/Eye (EE)	+1.4	Clevis/Eye (CE)	+0.4	Clevis/Clevis (CC)	-0.6
Clevis/Ball (CJ)	-1.0	Y-Clevis/Y-Clevis (YY)	+0.5	Y-Clevis/Tongue (YT)	+0.5
Y-Clevis/Eye (YE)	+0.9	Y-Clevis/Socket (YS)	-0.1	Clevis/Tongue (CT)	0

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length			Leakage Distance	Arcing Distance	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight
			YJ *inch* (mm)	SJ *inch* (mm)	EJ *inch* (mm)	*inch* (mm)	*inch* (mm)	Dry kV	Wet kV	Positive kV	Negative kV	*lbs.* (kg)
161/230	251-SC590-YJ	59	*80.9* (2055)	*80.3* (2040)	*81.5* (2070)	*164.9* (4189)	*71.4* (1815)	725	645	1145	1210	*12.5* (5.7)
	251-SS590-YJ					*199.8* (5074)	*72.0* (1829)	730	650	1155	1220	*15.4* (7.0)
	251-SL590-YJ					*259.6* (6593)	*72.8* (1849)	735	655	1170	1235	*21.0* (9.5)
230	251-SC640-YJ	64	*86.8* (2205)	*86.2* (2190)	*87.4* (2220)	*178.9* (4544)	*77.4* (1965)	780	695	1240	1310	*13.2* (6.0)
	251-SS640-YJ					*216.1* (5488)	*77.7* (1973)	780	700	1245	1315	*16.3* (7.4)
	251-SL640-YJ					*280.9* (7136)	*78.3* (1990)	785	705	1255	1325	*22.4* (10.2)
230	251-SC690-YJ	69	*92.7* (2355)	*92.1* (2340)	*93.3* (2370)	*192.9* (4899)	*83.3* (2115)	835	745	1330	1405	*13.9* (6.3)
	251-SS690-YJ					*233.5* (5932)	*83.8* (2129)	840	750	1340	1415	*17.3* (7.9)
	251-SL690-YJ					*303.5* (7708)	*84.6* (2149)	845	755	1350	1425	*23.9* (10.8)
230/345	251-SC740-YJ	74	*98.6* (2505)	*98.0* (2490)	*99.2* (2520)	*206.9* (5254)	*89.2* (2265)	890	795	1420	1500	*14.6* (6.6)
	251-SS740-YJ					*249.8* (6346)	*89.5* (2273)	890	795	1425	1505	*18.2* (8.3)
	251-SL740-YJ					*324.8* (8251)	*90.2* (2290)	895	805	1435	1515	*25.3* (11.5)
230/345	251-SC780-YJ	78	*103.3* (2625)	*102.8* (2610)	*103.9* (2640)	*218.0* (5538)	*93.9* (2385)	930	835	1495	1575	*15.2* (6.9)
	251-SS780-YJ					*263.3* (6689)	*94.2* (2393)	935	835	1500	1580	*19.0* (8.6)
	251-SL780-YJ					*342.4* (8697)	*94.9* (2410)	940	845	1510	1595	*26.4* (12.0)
345	251-SC810-YJ	81	*106.9* (2715)	*106.3* (2700)	*107.5* (2730)	*226.4* (5751)	*97.5* (2475)	965	865	1550	1635	*15.6* (7.1)
	251-SS810-YJ					*274.0* (6961)	*98.0* (2489)	970	870	1560	1645	*19.6* (8.9)
	251-SL810-YJ					*356.1* (9046)	*98.8* (2509)	975	875	1570	1655	*27.3* (12.4)
345	251-SC860-YJ	86	*112.8* (2865)	*112.2* (2850)	*113.4* (2880)	*240.4* (6106)	*103.4* (2626)	1010	905	1640	1730	*16.4* (7.4)
	251-SS860-YJ					*290.3* (7375)	*103.7* (2634)	1010	905	1645	1735	*20.5* (9.3)
	251-SL860-YJ					*377.5* (9589)	*104.4* (2651)	1015	910	1655	1745	*28.7* (13.0)
345	251-SC910-YJ	91	*118.7* (3015)	*118.3* (3005)	*119.3* (3030)	*254.4* (6461)	*109.3* (2776)	1050	940	1735	1825	*17.1* (7.7)
	251-SS910-YJ					*307.8* (7818)	*109.8* (2790)	1050	940	1740	1835	*21.5* (9.8)
	251-SL910-YJ					*400.0* (10161)	*110.6* (2810)	1055	945	1755	1850	*30.2* (13.7)
345	251-SC1000-YJ	100	*129.3* (3285)	*128.9* (3275)	*129.9* (3300)	*279.5* (7100)	*119.9* (3046)	1115	1000	1900	2000	*18.4* (8.3)
	251-SS1000-YJ					*337.6* (8575)	*120.2* (3054)	1115	1000	1905	2005	*23.2* (10.5)
	251-SL1000-YJ					*439.0* (11150)	*120.9* (3071)	1120	1005	1915	2015	*32.7* (14.8)
345/500	251-SC1090-YJ	109	*140.0* (3555)	*139.6* (3545)	*140.6* (3570)	*304.7* (7739)	*130.6* (3316)	1180	1055	2065	2170	*19.6* (8.9)
	251-SS1090-YJ					*368.6* (9362)	*131.1* (3330)	1185	1060	2070	2180	*24.9* (11.3)
	251-SL1090-YJ					*479.1* (12168)	*131.9* (3350)	1185	1065	2085	2195	*35.3* (16.0)

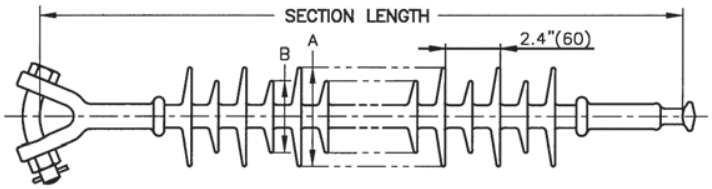
Approx. Weight is for Y-clevis & Ball unless otherwise specified.

Test methods and criteria are in accordance with ANSI C29.11 and ANSI C29.12, Latest Issue.

All tables show the typical products. Please contact **NGK** for other dimensions and end fitting combinations.

Electrical values exceeding the capacity (AC FOV>1200kV, L.I. FOV>3000kV) are presumed by the extrapolation of values obtained from short string unit.

ANSI 30kip / SC, SS, SL Shed Series



Shed Type	Shed Diameter	
	A	B
"SC" Normal	ø3.0" (ø76mm)	ø3.0" (ø76mm)
"SS" Alternating	ø4.2" (ø106mm)	ø3.0" (ø76mm)
"SL" Alternating	ø5.2" (ø132mm)	ø4.0" (ø102mm)

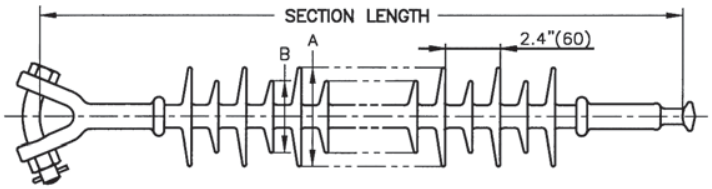
Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length YJ *inch* (mm)	Section Length SJ *inch* (mm)	Section Length EJ *inch* (mm)	Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover Dry kV	Low Frequency Flashover Wet kV	Critical Impulse Flashover Positive kV	Critical Impulse Flashover Negative kV	Approx. Weight *lbs.* (kg)
69	301-SC210-YJ	21	*37.8* (960)	*36.8* (935)	*38.0* (965)	*58.7* (1491)	*26.5* (674)	305	270	450	480	*7.7* (3.5)
	301-SS210-YJ					*71.5* (1816)	*27.1* (688)	310	275	460	490	*8.8* (4.0)
	301-SL210-YJ					*92.8* (2356)	*27.9* (708)	320	280	470	505	*10.8* (4.9)
69	301-SC250-YJ	25	*42.5* (1080)	*41.5* (1055)	*42.7* (1085)	*69.9* (1775)	*31.2* (794)	350	310	525	560	*8.3* (3.8)
	301-SS250-YJ					*85.0* (2159)	*31.8* (808)	355	310	535	565	*9.7* (4.4)
	301-SL250-YJ					*110.3* (2802)	*32.6* (828)	360	320	545	580	*11.9* (5.4)
69/115	301-SC280-YJ	28	*46.1* (1170)	*45.1* (1145)	*46.3* (1175)	*78.3* (1988)	*34.8* (884)	380	340	580	615	*8.8* (4.0)
	301-SS280-YJ					*94.5* (2401)	*35.1* (892)	385	340	585	620	*10.1* (4.6)
	301-SL280-YJ					*122.9* (3122)	*35.8* (909)	390	345	595	630	*12.8* (5.8)
69/115	301-SC310-YJ	31	*49.6* (1260)	*48.6* (1235)	*49.8* (1265)	*86.7* (2201)	*38.3* (974)	415	365	635	675	*9.3* (4.2)
	301-SS310-YJ					*105.2* (2673)	*38.9* (988)	420	370	645	680	*10.8* (4.9)
	301-SL310-YJ					*136.7* (3471)	*39.7* (1008)	430	380	655	695	*13.7* (6.2)
115/138	301-SC350-YJ	35	*54.3* (1380)	*53.3* (1355)	*54.5* (1385)	*97.8* (2485)	*43.1* (1094)	460	405	705	750	*9.7* (4.4)
	301-SS350-YJ					*118.7* (3016)	*43.6* (1108)	465	410	715	760	*11.5* (5.2)
	301-SL350-YJ					*154.2* (3917)	*44.4* (1128)	470	420	730	770	*14.8* (6.7)
138	301-SC390-YJ	39	*59.1* (1500)	*58.1* (1475)	*59.3* (1505)	*109.0* (2769)	*47.8* (1214)	505	445	780	825	*10.4* (4.7)
	301-SS390-YJ					*132.2* (3359)	*48.4* (1228)	510	450	790	835	*12.3* (5.6)
	301-SL390-YJ					*171.8* (4363)	*49.1* (1248)	515	460	800	850	*16.1* (7.3)
138/161	301-SC450-YJ	45	*66.1* (1680)	*65.2* (1655)	*66.3* (1685)	*125.8* (3195)	*54.9* (1394)	570	505	890	940	*11.2* (5.1)
	301-SS450-YJ					*152.5* (3874)	*55.4* (1408)	575	510	900	950	*13.5* (6.1)
	301-SL450-YJ					*198.1* (5032)	*56.2* (1428)	580	520	910	965	*17.6* (8.0)
161	301-SC500-YJ	50	*72.0* (1830)	*71.1* (1805)	*72.2* (1835)	*139.8* (3550)	*60.8* (1544)	625	555	980	1040	*11.9* (5.4)
	301-SS500-YJ					*168.8* (4288)	*61.1* (1552)	625	560	985	1045	*14.3* (6.5)
	301-SL500-YJ					*219.5* (5575)	*61.8* (1569)	635	565	995	1055	*19.2* (8.7)
161	301-SC550-YJ	55	*78.0* (1980)	*77.0* (1955)	*78.1* (1985)	*153.7* (3905)	*66.7* (1695)	680	605	1075	1135	*12.6* (5.7)
	301-SS550-YJ					*186.3* (4731)	*67.3* (1709)	685	610	1080	1145	*15.4* (7.0)
	301-SL550-YJ					*242.0* (6147)	*68.1* (1729)	690	615	1095	1155	*20.5* (9.3)
161/230	301-SC590-YJ	59	*82.7* (2100)	*81.7* (2075)	*82.9* (2105)	*164.9* (4189)	*71.4* (1815)	725	645	1145	1210	*13.2* (6.0)
	301-SS590-YJ					*199.8* (5074)	*72.0* (1829)	730	650	1155	1220	*16.1* (7.3)
	301-SL590-YJ					*259.6* (6593)	*72.8* (1849)	735	655	1170	1235	*21.8* (9.9)

30kip Other End Fitting Combination Section Length Adjustment Table, **Base Coupling: Eye-Ball (EJ)**, Inch			
Eye/Eye (EE)	+1.5	Y-Clevis/Y-Clevis (YY)	+1.1
Y-Clevis/Eye (YE)	+1.3	Y-Clevis/Socket (YS)	+0.1

Please contact **NGK** for additional end fittings and combinations, including Clevis and Tongue hardware.

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length YJ *inch* (mm)	Section Length SJ *inch* (mm)	Section Length EJ *inch* (mm)	Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover Dry kV	Low Frequency Flashover Wet kV	Critical Impulse Flashover Positive kV	Critical Impulse Flashover Negative kV	Approx. Weight *lbs.* (kg)
230	301-SC640-YJ	64	*88.6* (2250)	*87.6* (2225)	*88.8* (2255)	*178.9* (4544)	*77.4* (1965)	780	695	1240	1310	*13.9* (6.3)
	301-SS640-YJ					*216.1* (5488)	*77.7* (1973)	780	700	1245	1315	*17.0* (7.7)
	301-SL640-YJ					*280.9* (7136)	*78.3* (1990)	785	705	1255	1325	*23.2* (10.5)
230	301-SC690-YJ	69	*94.5* (2400)	*93.5* (2375)	*94.7* (2405)	*192.9* (4899)	*83.3* (2115)	835	745	1330	1405	*14.6* (6.6)
	301-SS690-YJ					*233.5* (5932)	*83.8* (2129)	840	750	1340	1415	*18.1* (8.2)
	301-SL690-YJ					*303.5* (7708)	*84.6* (2149)	845	755	1350	1425	*24.7* (11.2)
230/345	301-SC730-YJ	73	*99.2* (2520)	*98.2* (2495)	*99.4* (2525)	*204.1* (5183)	*88.0* (2235)	875	785	1405	1480	*15.2* (6.9)
	301-SS730-YJ					*247.0* (6275)	*88.5* (2249)	880	790	1410	1490	*18.7* (8.5)
	301-SL730-YJ					*321.0* (8154)	*89.3* (2269)	890	795	1425	1500	*25.8* (11.7)
345	301-SC810-YJ	81	*108.7* (2760)	*107.7* (2735)	*108.9* (2765)	*226.4* (5751)	*97.5* (2475)	965	865	1550	1635	*16.3* (7.4)
	301-SS810-YJ					*274.0* (6961)	*98.0* (2489)	970	870	1560	1645	*20.3* (9.2)
	301-SL810-YJ					*356.1* (9046)	*98.8* (2509)	975	875	1570	1655	*28.0* (12.7)
345	301-SC910-YJ	91	*120.5* (3060)	*119.5* (3035)	*120.7* (3065)	*254.4* (6461)	*109.3* (2776)	1050	940	1735	1825	*17.9* (8.1)
	301-SS910-YJ					*307.8* (7818)	*109.8* (2790)	1050	940	1740	1835	*22.3* (10.1)
	301-SL910-YJ					*400.0* (10161)	*110.6* (2810)	1055	945	1755	1850	*30.9* (14.0)
345	301-SC1000-YJ	100	*131.1* (3330)	*130.1* (3305)	*131.3* (3335)	*279.5* (7100)	*119.9* (3046)	1115	1000	1900	2000	*19.2* (8.7)
	301-SS1000-YJ					*337.6* (8575)	*120.2* (3054)	1115	1000	1905	2005	*23.8* (10.8)
	301-SL1000-YJ					*439.0* (11150)	*120.9* (3071)	1120	1005	1915	2015	*33.5* (15.2)
345/500	301-SC1090-YJ	109	*141.7* (3600)	*140.7* (3575)	*141.9* (3605)	*304.7* (7739)	*130.6* (3316)	1180	1055	2065	2170	*20.3* (9.2)
	301-SS1090-YJ					*368.6* (9362)	*131.1* (3330)	1185	1060	2070	2180	*25.6* (11.6)
	301-SL1090-YJ					*479.1* (12168)	*131.9* (3350)	1185	1065	2085	2195	*36.2* (16.4)

ANSI 50kip / SC, SS, SL Shed Series



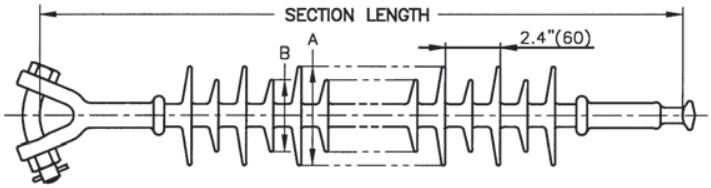
Shed Type	Shed Diameter	
	A	B
"SC" Normal	ø3.3" (ø84mm)	ø3.3" (ø84mm)
"SS" Alternating	ø4.5" (ø114mm)	ø3.3" (ø84mm)
"SL" Alternating	ø5.5" (ø140mm)	ø4.3" (ø110mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length YK *inch* (mm)	Section Length SK *inch* (mm)	Section Length EK *inch* (mm)	Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover Dry kV	Low Frequency Flashover Wet kV	Critical Impulse Flashover Positive kV	Critical Impulse Flashover Negative kV	Approx. Weight *lbs.* (kg)
69	502-SC210-YK	21	*40.0* (1015)	*39.6* (1005)	*40.2* (1020)	*58.7* (1491)	*26.5* (674)	305	270	450	480	*11.7* (5.3)
	502-SS210-YK					*71.5* (1816)	*27.1* (688)	310	275	460	490	*12.9* (5.9)
	502-SL210-YK					*92.8* (2356)	*27.9* (708)	320	280	470	505	*15.2* (6.9)
69	502-SC250-YK	25	*44.7* (1135)	*44.3* (1125)	*44.9* (1140)	*69.9* (1775)	*31.2* (794)	350	310	525	560	*12.5* (5.7)
	502-SS250-YK					*85.0* (2159)	*31.8* (808)	355	310	535	565	*13.9* (6.3)
	502-SL250-YK					*110.3* (2802)	*32.6* (828)	360	320	545	580	*16.6* (7.5)
69/115	502-SC280-YK	28	*48.2* (1225)	*47.8* (1215)	*48.4* (1230)	*78.3* (1988)	*34.8* (884)	380	340	580	615	*13.1* (6.0)
	502-SS280-YK					*94.5* (2401)	*35.1* (892)	385	340	585	620	*14.6* (6.6)
	502-SL280-YK					*122.9* (3122)	*35.8* (909)	390	345	595	630	*17.6* (8.0)
69/115	502-SC310-YK	31	*51.8* (1315)	*51.4* (1305)	*52.0* (1320)	*86.7* (2201)	*38.3* (974)	415	365	635	675	*13.7* (6.2)
	502-SS310-YK					*105.2* (2673)	*38.9* (988)	420	370	645	680	*15.4* (7.0)
	502-SL310-YK					*136.7* (3471)	*39.7* (1008)	430	380	655	695	*18.8* (8.5)
115/138	502-SC350-YK	35	*56.5* (1435)	*56.1* (1425)	*56.7* (1440)	*97.8* (2485)	*43.1* (1094)	460	405	705	750	*14.5* (6.6)
	502-SS350-YK					*118.7* (3016)	*43.6* (1108)	465	410	715	760	*16.4* (7.5)
	502-SL350-YK					*154.2* (3917)	*44.4* (1128)	470	420	730	770	*20.2* (9.2)
138	502-SC390-YK	39	*61.2* (1555)	*60.8* (1545)	*61.4* (1560)	*109.0* (2769)	*47.8* (1214)	505	445	780	825	*15.3* (6.9)
	502-SS390-YK					*132.2* (3359)	*48.4* (1228)	510	450	790	835	*17.5* (7.9)
	502-SL390-YK					*171.8* (4363)	*49.1* (1248)	515	460	800	850	*21.6* (9.8)
138/161	502-SC450-YK	45	*68.3* (1735)	*67.9* (1725)	*68.5* (1740)	*125.8* (3195)	*54.9* (1394)	570	505	890	940	*16.5* (7.5)
	502-SS450-YK					*152.5* (3874)	*55.4* (1408)	575	510	900	950	*19.0* (8.6)
	502-SL450-YK					*198.1* (5032)	*56.2* (1428)	580	520	910	965	*23.8* (10.8)
161	502-SC500-YK	50	*74.2* (1885)	*73.8* (1875)	*74.4* (1890)	*139.8* (3550)	*60.8* (1544)	625	555	980	1040	*17.5* (7.9)
	502-SS500-YK					*168.8* (4288)	*61.1* (1552)	625	560	985	1045	*20.2* (9.2)
	502-SL500-YK					*219.5* (5575)	*61.8* (1569)	635	565	995	1055	*25.5* (11.6)
161	502-SC550-YK	55	*80.1* (2035)	*79.7* (2025)	*80.5* (2045)	*153.7* (3905)	*66.7* (1695)	680	605	1075	1135	*18.5* (8.4)
	502-SS550-YK					*186.3* (4731)	*67.3* (1709)	685	610	1080	1145	*21.5* (9.8)
	502-SL550-YK					*242.0* (6147)	*68.1* (1729)	690	615	1095	1155	*27.4* (12.4)
161/230	502-SC590-YK	59	*84.8* (2155)	*84.4* (2145)	*85.2* (2165)	*164.9* (4189)	*71.4* (1815)	725	645	1145	1210	*19.3* (8.8)
	502-SS590-YK					*199.8* (5074)	*72.0* (1829)	730	650	1155	1220	*22.5* (10.2)
	502-SL590-YK					*259.6* (6593)	*72.8* (1849)	735	655	1170	1235	*28.9* (13.1)

50kip Other End Fitting Combination Section Length Adjustment Table, **Base Coupling: Eye-Ball (EK)**, Inch					
Eye/Eye (EE)	+1.4	Clevis/Eye (CE)	+1.2	Clevis/Clevis (CC)	+0.9
Clevis/Ball (CK)	-0.3	Y-Clevis/Y-Clevis (YY)	+0.6	Y-Clevis/Tongue (YT)	+1.0
Y-Clevis/Eye (YE)	+1.0	Y-Clevis/Socket (YS)	+0.3	Clevis/Tongue (CT)	+1.1

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length			Leakage Distance	Arcing Distance	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight
			YK *inch* (mm)	SK *inch* (mm)	EK *inch* (mm)	*inch* (mm)	*inch* (mm)	Dry kV	Wet kV	Positive kV	Negative kV	*lbs.* (kg)
230	502-SC640-YK	64	*90.7* (2305)	*90.4* (2295)	*91.1* (2315)	*178.9* (4544)	*77.4* (1965)	780	695	1240	1310	*20.3* (9.2)
	502-SS640-YK					*216.1* (5488)	*77.7* (1973)	780	700	1245	1315	*23.7* (10.8)
	502-SL640-YK					*280.9* (7136)	*78.3* (1990)	785	705	1255	1325	*30.6* (13.9)
230	502-SC690-YK	69	*96.7* (2455)	*96.3* (2445)	*97.0* (2465)	*192.9* (4899)	*83.3* (2115)	835	745	1330	1405	*21.3* (9.7)
	502-SS690-YK					*233.5* (5932)	*83.8* (2129)	840	750	1340	1415	*25.1* (11.4)
	502-SL690-YK					*303.5* (7708)	*84.6* (2149)	845	755	1350	1425	*32.5* (14.7)
230/345	502-SC730-YK	73	*101.4* (2575)	*101.0* (2565)	*101.8* (2585)	*204.1* (5183)	*88.0* (2235)	875	785	1405	1480	*22.1* (10.0)
	502-SS730-YK					*247.0* (6275)	*88.5* (2249)	880	790	1410	1490	*26.1* (11.8)
	502-SL730-YK					*321.0* (8154)	*89.3* (2269)	890	795	1425	1500	*33.9* (15.4)
345	502-SC810-YK	81	*110.8* (2815)	*110.4* (2805)	*111.2* (2825)	*226.4* (5751)	*97.5* (2475)	965	865	1550	1635	*23.7* (10.8)
	502-SS810-YK					*274.0* (6961)	*98.0* (2489)	970	870	1560	1645	*28.1* (12.8)
	502-SL810-YK					*356.1* (9046)	*98.8* (2509)	975	875	1570	1655	*36.8* (16.7)
345	502-SC910-YK	91	*122.6* (3115)	*122.4* (3110)	*123.0* (3125)	*254.4* (6461)	*109.3* (2776)	1050	940	1735	1825	*25.7* (11.7)
	502-SS910-YK					*307.8* (7818)	*109.8* (2790)	1050	940	1740	1835	*30.6* (13.9)
	502-SL910-YK					*400.0* (10161)	*110.6* (2810)	1055	945	1755	1850	*40.4* (18.3)
345	502-SC1000-YK	100	*133.3* (3385)	*133.1* (3380)	*133.7* (3395)	*279.5* (7100)	*119.9* (3046)	1115	1000	1900	2000	*27.5* (12.5)
	502-SS1000-YK					*337.6* (8575)	*120.2* (3054)	1115	1000	1905	2005	*32.8* (14.9)
	502-SL1000-YK					*439.0* (11150)	*120.9* (3071)	1120	1005	1915	2015	*43.6* (19.8)
345/500	502-SC1090-YK	109	*143.9* (3655)	*143.7* (3650)	*144.3* (3665)	*304.7* (7739)	*130.6* (3316)	1180	1055	2065	2170	*29.3* (13.3)
	502-SS1090-YK					*368.6* (9362)	*131.1* (3330)	1185	1060	2070	2180	*35.2* (16.0)
	502-SL1090-YK					*479.1* (12168)	*131.9* (3350)	1185	1065	2085	2195	*46.9* (21.3)
500	502-SC1170-YK	117	*153.3* (3895)	*153.1* (3890)	*153.7* (3905)	*327.0* (8307)	*140.0* (3556)	1235	1105	2210	2325	*30.9* (14.0)
	502-SS1170-YK					*395.6* (10048)	*140.6* (3570)	1235	1110	2220	2335	*37.2* (16.9)
	502-SL1170-YK					*514.2* (13060)	*141.4* (3590)	1240	1110	2230	2350	*49.8* (22.6)
500	502-SC1310-YK	131	*169.9* (4315)	*169.7* (4310)	*170.3* (4325)	*366.2* (9301)	*156.6* (3977)	1325	1185	2465	2595	*33.7* (15.3)
	502-SS1310-YK					*442.8* (11248)	*157.1* (3991)	1325	1190	2475	2605	*40.8* (18.5)
	502-SL1310-YK					*575.6* (14621)	*157.9* (4011)	1330	1190	2485	2615	*54.8* (24.9)
500/765	502-SC1410-YK	141	*181.7* (4615)	*181.5* (4610)	*182.1* (4625)	*394.1* (10011)	*168.4* (4277)	1385	1240	2650	2785	*35.7* (16.2)
	502-SS1410-YK					*476.6* (12106)	*168.9* (4291)	1390	1245	2660	2795	*43.3* (19.7)
	502-SL1410-YK					*619.5* (15736)	*169.7* (4311)	1390	1245	2670	2810	*58.4* (26.5)
765	502-SC1530-YK	153	*196.1* (4980)	*195.7* (4970)	*196.3* (4985)	*427.7* (10863)	*182.6* (4638)	1455	1305	2870	3020	*38.1* (17.3)
	502-SS1530-YK					*517.1* (13135)	*183.1* (4652)	1455	1305	2875	3025	*46.3* (21.0)
	502-SL1530-YK					*672.2* (17074)	*183.9* (4672)	1460	1310	2890	3040	*62.7* (28.5)

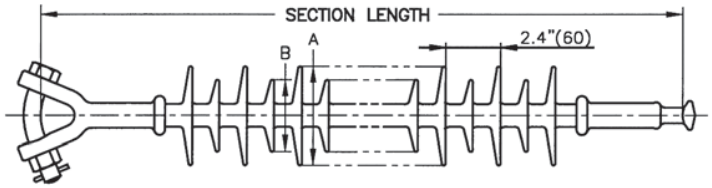
Extra Long Leakage — ANSI 25kip / SE Shed Series



Shed Type	Shed Diameter	
	A	B
"SE" Alternating	ø5.9" (ø151mm)	ø4.8" (ø121mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length			Leakage Distance	Arcing Distance	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight
			YJ *inch* (mm)	SJ *inch* (mm)	EJ *inch* (mm)	*inch* (mm)	*inch* (mm)	Dry kV	Wet kV	Positive kV	Negative kV	*lbs.* (kg)
69	251-SE210-YJ	21	*36.0* (915)	*35.4* (900)	*36.4* (925)	*108.3* (2750)	*28.5* (725)	325	285	480	515	*11.9* (5.4)
69	251-SE250-YJ	25	*40.7* (1035)	*40.2* (1020)	*41.1* (1045)	*128.8* (3271)	*33.3* (845)	370	325	555	590	*13.4* (6.1)
69/115	251-SE280-YJ	28	*44.3* (1125)	*43.7* (1110)	*44.7* (1135)	*143.6* (3647)	*36.4* (925)	395	350	605	640	*14.4* (6.6)
69/115	251-SE310-YJ	31	*47.8* (1215)	*47.2* (1200)	*48.2* (1225)	*159.5* (4053)	*40.4* (1025)	435	385	665	705	*15.6* (7.1)
115/138	251-SE350-YJ	35	*52.6* (1335)	*52.0* (1320)	*53.0* (1345)	*180.1* (4574)	*45.1* (1145)	480	425	740	785	*17.1* (7.8)
138	251-SE390-YJ	39	*57.3* (1455)	*56.7* (1440)	*57.7* (1465)	*200.6* (5095)	*49.8* (1265)	520	465	810	860	*18.6* (8.4)
138	251-SE410-YJ	41	*59.6* (1515)	*59.1* (1500)	*60.0* (1525)	*210.8* (5355)	*52.2* (1325)	545	485	850	900	*19.3* (8.8)
138/161	251-SE450-YJ	45	*64.4* (1635)	*63.8* (1620)	*64.8* (1645)	*231.3* (5876)	*56.9* (1445)	590	525	920	975	*20.8* (9.5)
161	251-SE500-YJ	50	*70.3* (1785)	*69.7* (1770)	*70.7* (1795)	*256.4* (6513)	*62.4* (1585)	640	570	1005	1065	*22.6* (10.3)
161	251-SE550-YJ	55	*76.2* (1935)	*75.6* (1920)	*76.8* (1950)	*282.6* (7179)	*68.7* (1746)	700	625	1105	1165	*24.5* (11.1)
161/230	251-SE590-YJ	59	*80.9* (2055)	*80.3* (2040)	*81.5* (2070)	*303.1* (7700)	*73.5* (1866)	740	665	1180	1245	*26.0* (11.8)
230	251-SE640-YJ	64	*86.8* (2205)	*86.2* (2190)	*87.4* (2220)	*328.2* (8336)	*79.0* (2006)	795	710	1265	1335	*27.8* (12.6)
230	251-SE690-YJ	69	*92.7* (2355)	*92.1* (2340)	*93.3* (2370)	*354.4* (9002)	*85.3* (2166)	850	760	1360	1435	*29.7* (13.5)
230/345	251-SE740-YJ	74	*98.6* (2505)	*98.0* (2490)	*99.2* (2520)	*379.5* (9639)	*90.8* (2306)	905	810	1445	1525	*31.5* (14.3)
230/345	251-SE780-YJ	78	*103.3* (2625)	*102.8* (2610)	*103.9* (2640)	*400.0* (10160)	*95.5* (2426)	945	850	1520	1605	*33.0* (15.0)
345	251-SE810-YJ	81	*106.9* (2715)	*106.3* (2700)	*107.5* (2730)	*415.9* (10565)	*99.5* (2526)	980	880	1580	1665	*34.2* (15.5)
345	251-SE860-YJ	86	*112.8* (2865)	*112.2* (2850)	*113.4* (2880)	*441.0* (11202)	*105.0* (2667)	1020	915	1665	1755	*35.9* (16.3)
345	251-SE910-YJ	91	*118.7* (3015)	*118.3* (3005)	*119.3* (3030)	*467.2* (11868)	*111.3* (2827)	1060	950	1765	1860	*37.9* (17.2)
345	251-SE1000-YJ	100	*129.3* (3285)	*128.9* (3275)	*129.9* (3300)	*512.8* (13025)	*121.5* (3087)	1125	1010	1925	2025	*41.1* (18.7)
345/500	251-SE1090-YJ	109	*140.0* (3555)	*139.6* (3545)	*140.6* (3570)	*559.5* (14212)	*132.6* (3367)	1190	1065	2095	2205	*44.5* (20.2)

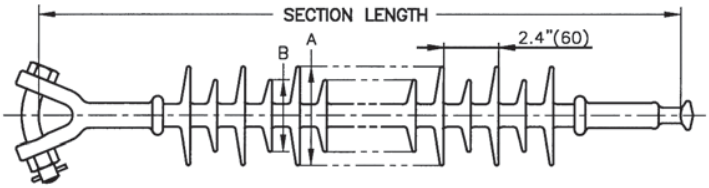
Extra Long Leakage — ANSI 30kip / SE Shed Series



Shed Type	Shed Diameter	
	A	B
"SE" Alternating	ø5.9" (ø151mm)	ø4.8" (ø121mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length			Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight *lbs.* (kg)
			YJ *inch* (mm)	SJ *inch* (mm)	EJ *inch* (mm)			Dry kV	Wet kV	Positive kV	Negative kV	
69	301-SE210-YJ	21	*37.8* (960)	*36.8* (935)	*38.0* (965)	*108.3* (2750)	*28.5* (725)	325	285	480	515	*12.6* (5.7)
69	301-SE250-YJ	25	*42.5* (1080)	*41.5* (1055)	*42.7* (1085)	*128.8* (3271)	*33.3* (845)	370	325	555	590	*14.1* (6.4)
69/115	301-SE280-YJ	28	*46.1* (1170)	*45.1* (1145)	*46.3* (1175)	*143.6* (3647)	*36.4* (925)	395	350	605	640	*15.2* (6.9)
69/115	301-SE310-YJ	31	*49.6* (1260)	*48.6* (1235)	*49.8* (1265)	*159.5* (4053)	*40.4* (1025)	435	385	665	705	*16.3* (7.4)
115/138	301-SE350-YJ	35	*54.3* (1380)	*53.3* (1355)	*54.5* (1385)	*180.1* (4574)	*45.1* (1145)	480	425	740	785	*17.9* (8.1)
138	301-SE390-YJ	39	*59.1* (1500)	*58.1* (1475)	*59.3* (1505)	*200.6* (5095)	*49.8* (1265)	520	465	810	860	*19.4* (8.8)
138/161	301-SE450-YJ	45	*66.1* (1680)	*65.2* (1655)	*66.3* (1685)	*231.3* (5876)	*56.9* (1445)	590	525	920	975	*21.6* (9.8)
161	301-SE500-YJ	50	*72.0* (1830)	*71.1* (1805)	*72.2* (1835)	*256.4* (6513)	*62.4* (1585)	640	570	1005	1065	*23.3* (10.6)
161	301-SE550-YJ	55	*78.0* (1980)	*77.0* (1955)	*78.1* (1985)	*282.6* (7179)	*68.7* (1746)	700	625	1105	1165	*25.4* (11.5)
161/230	301-SE590-YJ	59	*82.7* (2100)	*81.7* (2075)	*82.9* (2105)	*303.1* (7700)	*73.5* (1866)	740	665	1180	1245	*26.7* (12.1)
230	301-SE640-YJ	64	*88.6* (2250)	*87.6* (2225)	*88.8* (2255)	*328.2* (8336)	*79.0* (2006)	795	710	1265	1335	*28.4* (12.9)
230	301-SE690-YJ	69	*94.5* (2400)	*93.5* (2375)	*94.7* (2405)	*354.4* (9002)	*85.3* (2166)	850	760	1360	1435	*30.4* (13.8)
230/345	301-SE730-YJ	73	*99.2* (2520)	*98.2* (2495)	*99.4* (2525)	*374.9* (9523)	*90.0* (2286)	895	800	1435	1515	*32.0* (14.5)
345	301-SE810-YJ	81	*108.7* (2760)	*107.7* (2735)	*108.9* (2765)	*415.9* (10565)	*99.5* (2526)	980	880	1580	1665	*34.8* (15.8)
345	301-SE910-YJ	91	*120.5* (3060)	*119.5* (3035)	*120.7* (3065)	*467.2* (11868)	*111.3* (2827)	1060	950	1765	1860	*38.6* (17.5)
345	301-SE1000-YJ	100	*131.1* (3330)	*130.1* (3305)	*131.3* (3335)	*512.8* (13025)	*121.5* (3087)	1125	1010	1925	2025	*41.9* (19.0)
345/500	301-SE1090-YJ	109	*141.7* (3600)	*140.7* (3575)	*141.9* (3605)	*559.5* (14212)	*132.6* (3367)	1190	1065	2095	2205	*45.2* (20.5)

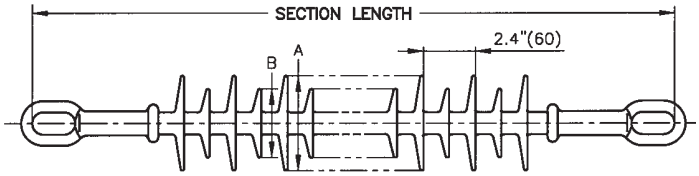
Extra Long Leakage — ANSI 50kip / SE Shed Series



Shed Type	Shed Diameter	
	A	B
"SE" Alternating	ø6.3" (ø159mm)	ø5.1" (ø129mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length			Leakage Distance	Arcing Distance	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight
			YK *inch* (mm)	SK *inch* (mm)	EK *inch* (mm)	*inch* (mm)	*inch* (mm)	Dry kV	Wet kV	Positive kV	Negative kV	*lbs.* (kg)
69	502-SE210-YK	21	*40.0* (1015)	*39.6* (1005)	*40.2* (1020)	*108.3* (2750)	*28.5* (725)	325	285	480	515	*17.1* (7.8)
69	502-SE250-YK	25	*44.7* (1135)	*44.3* (1125)	*44.9* (1140)	*128.8* (3271)	*33.3* (845)	370	325	555	590	*18.9* (8.6)
69/115	502-SE280-YK	28	*48.2* (1225)	*47.8* (1215)	*48.4* (1230)	*143.6* (3647)	*36.4* (925)	395	350	605	640	*20.2* (9.2)
69/115	502-SE310-YK	31	*51.8* (1315)	*51.4* (1305)	*52.0* (1320)	*159.5* (4053)	*40.4* (1025)	435	385	665	705	*21.6* (9.8)
115/138	502-SE350-YK	35	*56.5* (1435)	*56.1* (1425)	*56.7* (1440)	*180.1* (4574)	*45.1* (1145)	480	425	740	785	*23.5* (10.7)
138	502-SE390-YK	39	*61.2* (1555)	*60.8* (1545)	*61.4* (1560)	*200.6* (5095)	*49.8* (1265)	520	465	810	860	*25.3* (11.5)
138/161	502-SE450-YK	45	*68.3* (1735)	*67.9* (1725)	*68.5* (1740)	*231.3* (5876)	*56.9* (1445)	590	525	920	975	*28.0* (12.7)
161	502-SE500-YK	50	*74.2* (1885)	*73.8* (1875)	*74.4* (1890)	*256.4* (6513)	*62.4* (1585)	640	570	1005	1065	*30.2* (13.7)
161	502-SE550-YK	55	*80.1* (2035)	*79.7* (2025)	*80.5* (2045)	*282.6* (7179)	*68.7* (1746)	700	625	1105	1165	*32.5* (14.8)
161/230	502-SE590-YK	59	*84.8* (2155)	*84.4* (2145)	*85.2* (2165)	*303.1* (7700)	*73.5* (1866)	740	665	1180	1245	*34.3* (15.6)
230	502-SE640-YK	64	*90.7* (2305)	*90.4* (2295)	*91.1* (2315)	*328.2* (8336)	*79.0* (2006)	795	710	1265	1335	*36.5* (16.6)
230	502-SE690-YK	69	*96.7* (2455)	*96.3* (2445)	*97.0* (2465)	*354.4* (9002)	*85.3* (2166)	850	760	1360	1435	*38.9* (17.6)
230/345	502-SE730-YK	73	*101.4* (2575)	*101.0* (2565)	*101.8* (2585)	*374.9* (9523)	*90.0* (2286)	895	800	1435	1515	*40.7* (18.5)
345	502-SE810-YK	81	*110.8* (2815)	*110.4* (2805)	*111.2* (2825)	*415.9* (10565)	*99.5* (2526)	980	880	1580	1665	*44.3* (20.1)
345	502-SE910-YK	91	*122.6* (3115)	*122.4* (3110)	*123.0* (3125)	*467.2* (11868)	*111.3* (2827)	1060	950	1765	1860	*48.8* (22.2)
345	502-SE1000-YK	100	*133.3* (3385)	*133.1* (3380)	*133.7* (3395)	*512.8* (13025)	*121.5* (3087)	1125	1010	1925	2025	*52.8* (24.0)
345/500	502-SE1090-YK	109	*143.9* (3655)	*143.7* (3650)	*144.3* (3665)	*559.5* (14212)	*132.6* (3367)	1190	1065	2095	2205	*57.0* (25.9)
500	502-SE1170-YK	117	*153.3* (3895)	*153.1* (3890)	*153.7* (3905)	*600.6* (15254)	*142.0* (3607)	1245	1115	2240	2360	*60.6* (27.5)
500	502-SE1310-YK	131	*169.9* (4315)	*169.7* (4310)	*170.3* (4325)	*672.3* (17078)	*158.6* (4028)	1335	1195	2495	2630	*67.0* (30.4)
500/765	502-SE1410-YK	141	*181.7* (4615)	*181.5* (4610)	*182.1* (4625)	*723.6* (18380)	*170.4* (4328)	1395	1250	2680	2820	*71.5* (32.5)
765	502-SE1530-YK	153	*196.1* (4980)	*195.7* (4970)	*196.3* (4985)	*785.2* (19943)	*184.6* (4689)	1465	1310	2900	3050	*76.9* (34.9)

ANSI 80kip / SL, SE Shed Series



Shed Type	Shed Diameter	
	A	B
"SL" Alternating	ø5.8" (ø148mm)	ø4.6" (ø118mm)
"SE" Alternating	ø6.6" (ø167mm)	ø5.4" (ø137mm)

Typical System Voltage (kV)	Catalog No.	No. of Sheds	Section Length *inch* (mm)	Leakage Distance *inch* (mm)	Arcing Distance *inch* (mm)	Low Frequency Flashover		Critical Impulse Flashover		Approx. Weight *lbs.* (kg)
						Dry kV	Wet kV	Positive kV	Negative kV	
230	803-SL640-EE	64	*98.4* (2500)	*280.9* (7136)	*78.3* (1990)	785	705	1255	1325	*48.0* (21.8)
	803-SE640-EE			*328.2* (8336)	*79.0* (2006)	795	710	1265	1335	*54.6* (24.8)
230	803-SL690-EE	69	*104.3* (2650)	*303.5* (7708)	*84.6* (2149)	845	755	1350	1425	*50.4* (22.9)
	803-SE690-EE			*354.4* (9002)	*85.3* (2166)	850	760	1360	1435	*57.4* (26.1)
230/345	803-SL730-EE	73	*109.1* (2770)	*321.0* (8154)	*89.3* (2269)	890	795	1425	1500	*52.2* (23.7)
	803-SE730-EE			*374.9* (9523)	*90.0* (2286)	895	800	1435	1515	*59.6* (27.1)
345	803-SL810-EE	81	*118.5* (3010)	*356.1* (9046)	*98.8* (2509)	975	875	1570	1655	*55.7* (25.3)
	803-SE810-EE			*415.9* (10565)	*99.5* (2526)	980	880	1580	1665	*64.0* (29.1)
345	803-SL910-EE	91	*130.3* (3311)	*400.0* (10161)	*110.6* (2810)	1055	945	1755	1850	*60.2* (27.3)
	803-SE910-EE			*467.2* (11868)	*111.3* (2827)	1060	950	1765	1860	*69.5* (31.5)
345	803-SL1000-EE	100	*141* (3581)	*439.0* (11150)	*120.9* (3071)	1120	1005	1915	2015	*64.2* (29.1)
	803-SE1000-EE			*512.8* (13025)	*121.5* (3087)	1125	1010	1925	2025	*74.3* (33.8)
345/500	803-SL1090-EE	109	*151.6* (3851)	*479.1* (12168)	*131.9* (3350)	1185	1065	2085	2195	*68.3* (31.0)
	803-SE1090-EE			*559.5* (14212)	*132.6* (3367)	1190	1065	2095	2205	*79.4* (36.0)
500	803-SL1170-EE	117	*161.1* (4091)	*514.2* (13060)	*141.4* (3590)	1240	1110	2230	2350	*71.9* (32.6)
	803-SE1170-EE			*600.6* (15254)	*142.0* (3607)	1245	1115	2240	2360	*83.8* (38.0)
500	803-SL1310-EE	131	*177.6* (4512)	*575.6* (14621)	*157.9* (4011)	1330	1190	2485	2615	*78.1* (35.5)
	803-SE1310-EE			*672.3* (17078)	*158.6* (4028)	1335	1195	2495	2630	*91.5* (41.5)
500/765	803-SL1410-EE	141	*189.5* (4812)	*619.5* (15736)	*169.7* (4311)	1390	1245	2670	2810	*82.6* (37.5)
	803-SE1410-EE			*723.6* (18380)	*170.4* (4328)	1395	1250	2680	2820	*97.0* (44.0)
765	803-SL1530-EE	153	*203.6* (5173)	*672.2* (17074)	*183.9* (4672)	1460	1310	2890	3040	*88.0* (39.9)
	803-SE1530-EE			*785.2* (19943)	*184.6* (4689)	1465	1310	2900	3050	*103.6* (47.0)
765	803-SL1620-EE	162	*214.3* (5443)	*711.1* (18063)	*194.2* (4933)	1510	1350	3050	3205	*91.9* (41.7)
	803-SE1620-EE			*830.7* (21101)	*194.8* (4949)	1510	1355	3060	3215	*108.4* (49.2)
765	803-SL1710-EE	171	*224.9* (5713)	*751.2* (19081)	*205.2* (5212)	1555	1395	3220	3385	*96.0* (43.6)
	803-SE1710-EE			*877.5* (22288)	*205.9* (5229)	1560	1395	3230	3395	*113.5* (51.5)
765	803-SL1800-EE	180	*235.6* (5983)	*790.2* (20070)	*215.5* (5473)	1600	1435	3380	3555	*100.0* (45.4)
	803-SE1800-EE			*923.0* (23445)	*216.1* (5489)	1605	1435	3390	3565	*118.3* (53.7)

PACKAGING

All of NGK's insulators are packed in weatherproof containers in order to protect the products during land, air, and sea transportation. Several different grades of packaging can be offered depending on the mode of transport and the expected storage conditions. The packaging options that we offer are shown below. Since the user best knows their crate requirements, they should select the option that is most suited to their needs and include that information in the purchasing specification. Special packaging arrangements can be accommodated upon request.

Each container is marked with the number of insulators it contains, the catalog number, description of the containers, the manufacturer's name, and any other customer requests. Also, a polymer insulator handling instruction sheet is included with all containers. This sheet states any necessary cautions during handling, transportation, and installation. If corona rings are to be included, a corona ring installation sheet is also provided.

Standard Grade: Prefabricated Packaging

Suitable for:

- Moderate Amount of Handling
- Outdoor Storage
- Careful Stacking

Economical Grade: Cardboard Carton

Suitable for:

- Limited Amount of Handling
- Indoor Storage or Outdoors Only in Dry Areas
- Minimal Stacking
- Small Quantity of Insulators
- Immediate Use

Best Grade: Closed Wooden Crate

Suitable for:

- Excessive Amount of Handling
- Long Term Outdoor Storage
- Crate Stacking
- Large Quantities of Large Insulators
- Transportation Over Rough Roads

POLYMER SUSPENSION INSULATOR APPLICATION

Suspension polymer insulators are designed and manufactured by NGK with great care to ensure reliable performance and maximum longevity. However, polymer insulators have been damaged because users allowed polymer insulators to come into contact with sharp or abrasive surfaces. They have also been damaged because they were loaded in bending or torsion.

To ensure satisfactory service, polymer suspension insulators must be handled properly and loaded only in tension. Sufficient intermediate hardware should be installed between structure and insulator and between conductor and insulator. This allows adequate flexibility preventing the polymer insulator from being loaded in a bending mode. Polymer insulators must be handled carefully during construction. Users are encouraged to become familiar with NGK'S **Polymer Suspension Insulator Handling Guide** and **Polymer Insulator Application Guide.** These guides explain in detail the correct handling, loading, and application of polymer insulators. They may be obtained from your local NGK sales agents.

NGK

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